CCS Technical Documentation
RH-17 Series Transceivers

Troubleshooting – Antennas

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Troubleshooting - Antennas

This troubleshooting guide addresses potential failures that will affect the antenna performance of the RH-17 phone, and how to correct these failures.

For additional information, refer to *Haukka Antenna RF Specifications and Plan* (DHS02290-EN-1.0)

Appearance of the Phone

Figure 1: Front of RH-17

Figure 2: Back of RH-17

Figure 3: Back and Top of RH-17

Note in Figure 3 that when the whip antenna is properly installed, the cap "clicks" into the D-cover when the whip is fully retracted.

Failures and Corrective Measures

Missing Internal Antenna or Whip Antenna

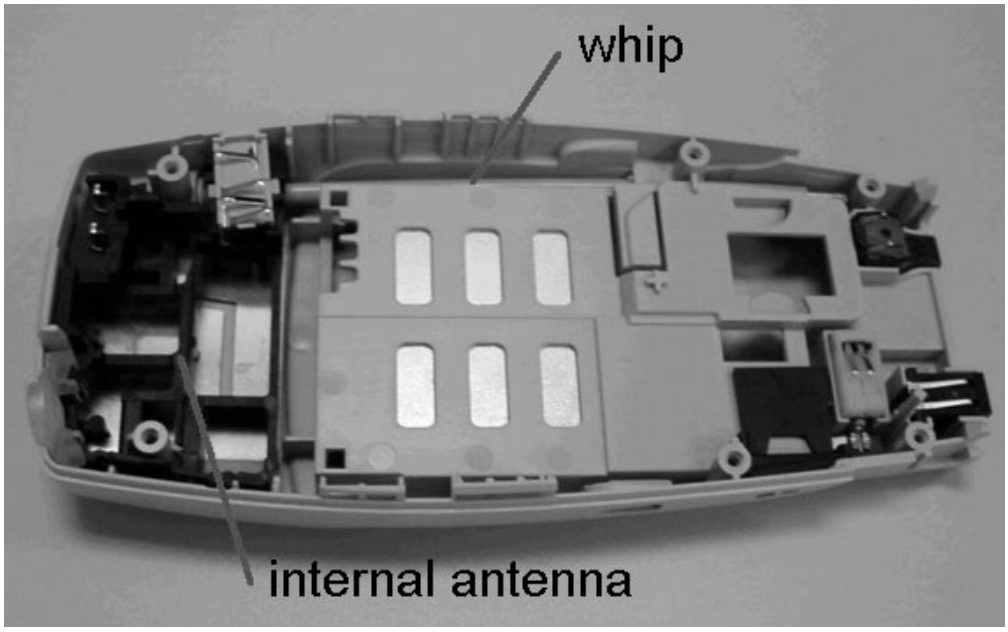

Figure 4: RH-17 D-cover assembly

Note that the whip antenna must be inserted prior to inserting the internal antenna.

If the internal antenna is missing, install one. If the radiator looks obviously damaged, then replace the internal antenna.

If no antenna is installed, the antenna gain will be degraded by more than 25 dB.

If the whip antenna is missing, then remove the internal antenna, install a whip, and reinstall the internal antenna.

Damaged RF Feed Pin or Ground Pin

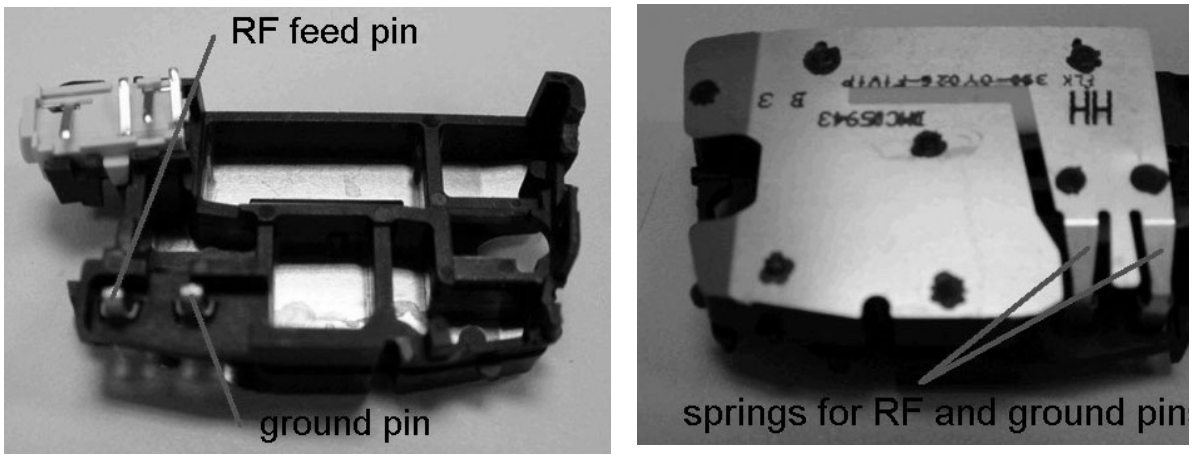

Figure 5: Top and Bottom View of the RH-17 Internal Antenna

If either the RF feed pin or ground pin are broken, or bent such that either pin will not touch the PWB, then the internal antenna must be replaced. If the springs for the RF or ground pin appear damaged, then the internal antenna must be replaced. If the slot in

the radiator has a significantly different shape, then the correct internal antenna must be installed. Be aware that the shape of the slot can vary slightly. The length of the horizontal slot can vary by a few millimeters, because the antennas are tuned for each batch of plastic frames. If there is any other obvious damage to the radiator (dents, corrosion), then the antenna should be replaced. If the pin gets stuck or has excessive friction in the plastic tube/guiding feature, then the spring will not work properly, and the antenna should be replaced.

If the RF feed doesn't touch the PWB, then the antenna gain will degrade by more than 25 dB. If the ground pin doesn't touch the PWB, then the antenna gain may degrade about 5 dB to 10 dB.

Wrong Internal Antenna Installed

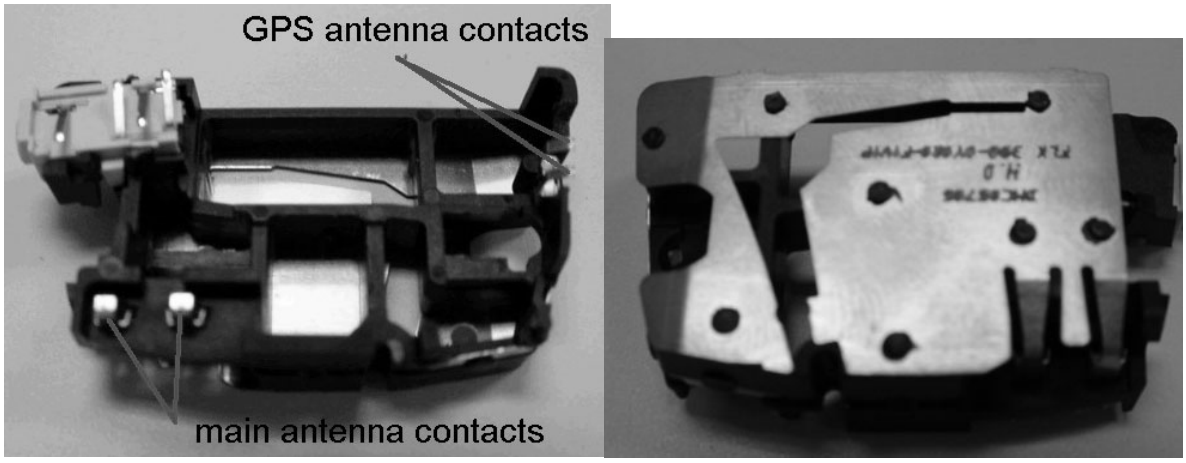

Figure 6: Top and bottom view of RH-3 antenna

The RH-17 and RH-3 antennas share the same mechanical interface with the D-cover. As a result, either antenna may be installed in either phone. The important differences visually in the antennas are that the slot pattern is very different, and there also is a GPS antenna present in the RH-3 which is absent in the RH-17.

If the wrong antenna is installed, install the correct one.

Installing an RH-3 antenna in the RH-17 phone will change the antenna gain by a few dB at 850 MHz, and the phone will not be compliant with FCC submission. Installing a RH-17 antenna in a RH-3 phone will degrade the PCS performance by at least 6 dB, as the RH-17 antenna is not tuned for PCS. In addition, if an RH-17 antenna is installed in the RH-3, GPS will degrade by about 25 dB as the RH-17 doesn't have a GPS antenna.

Obstructed RF Feed and Ground Pads for the Internal Antenna

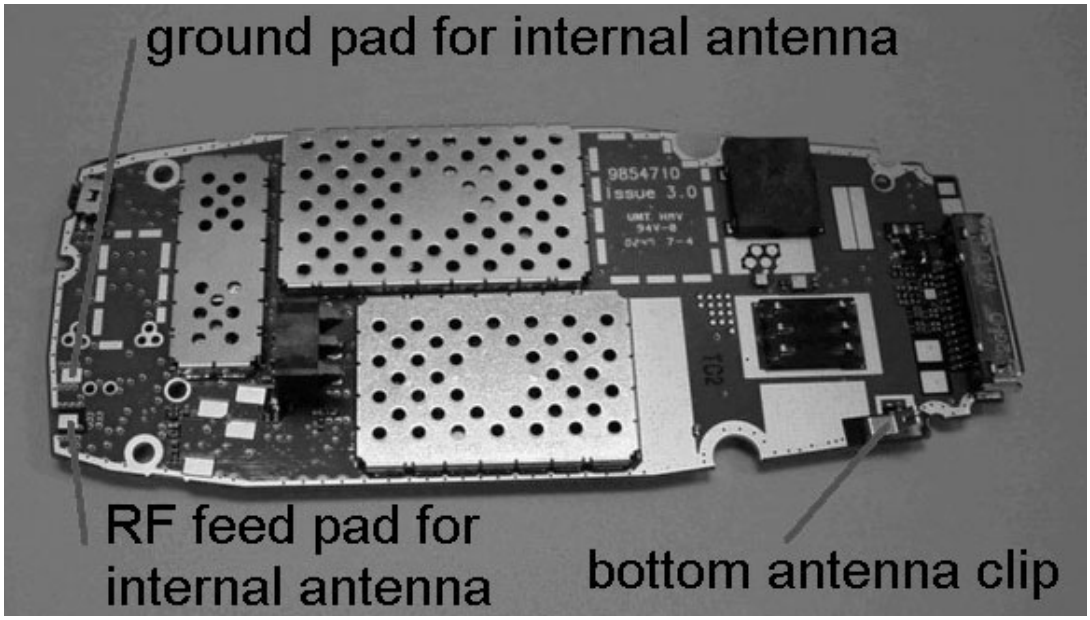

Figure 7: PWB layout of RF feed and ground pads, and bottom antenna clip

If the RF feed pad is obstructed, removed, or covered, then the RF feed pin will not touch the PWB and then the antenna gain will degrade by more than 25 dB. If the ground pad is obstructed, removed, or covered, then the ground pin will not touch the PWB, and then the antenna gain may degrade about 5 to 10 dB. If corrosion is present or the pad is missing, then most likely the PWB and phone needs to be replaced. In either pad is obstructed or covered, the pad should be cleared and/or cleaned.

Broken or Missing Antenna Clip

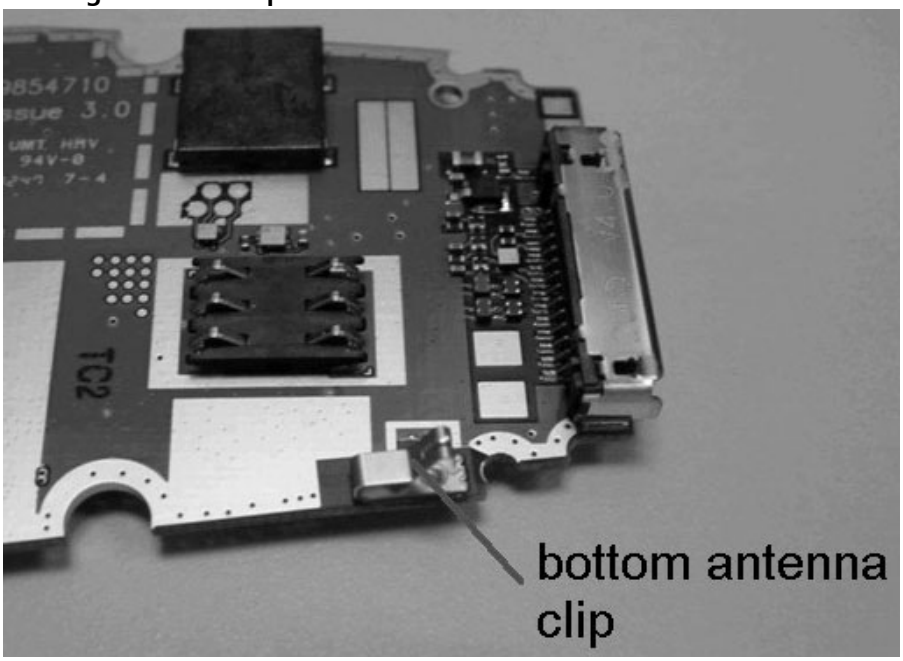

Figure 8: Bottom antenna clip

If the bottom antenna clip does not contact the whip stopper, when the whip is fully retracted, then the internal antenna gain will degrade by about 4-5 dB in the RX portion of CELL band. If the antenna clip is installed backwards, is damaged, or is missing, then install a new bottom antenna clip in the correct position.

Obstructed Whip Stopper

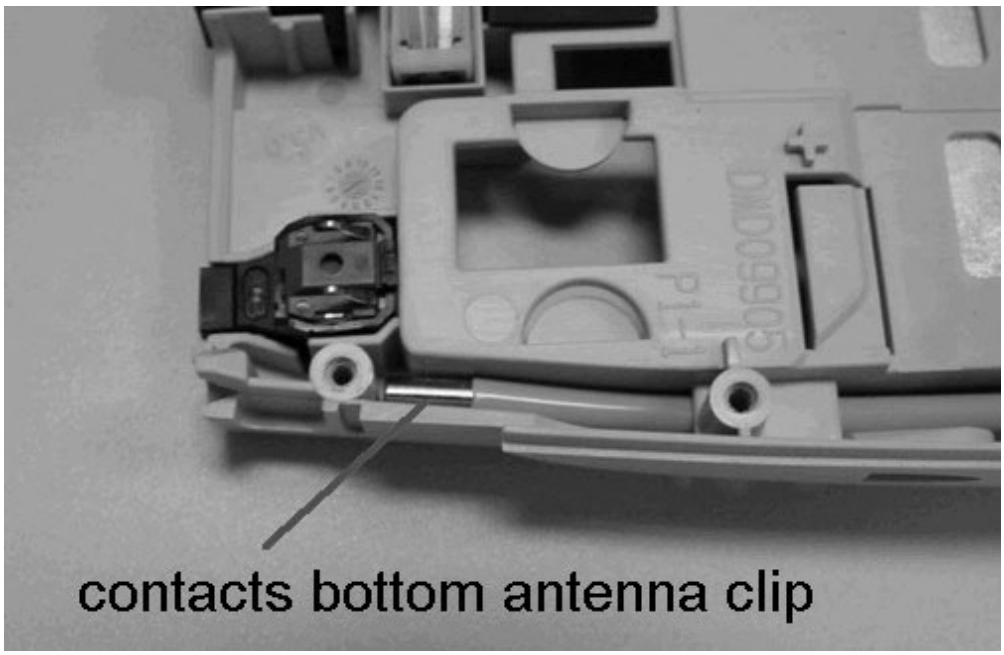

Figure 9: Whip stopper as shown when the whip is fully retracted

If the whip stopper is corroded or blocked by the whip straw, then the whip assembly needs to be replaced. If the whip stopper is obstructed or dirty, then the obstruction and/or dirt needs to be removed. If the whip stopper doesn't properly contact the bottom antenna clip, then the internal antenna gain will degrade by about 4-5 dB in the RX portion of CELL band.

Grounding of Display Frame

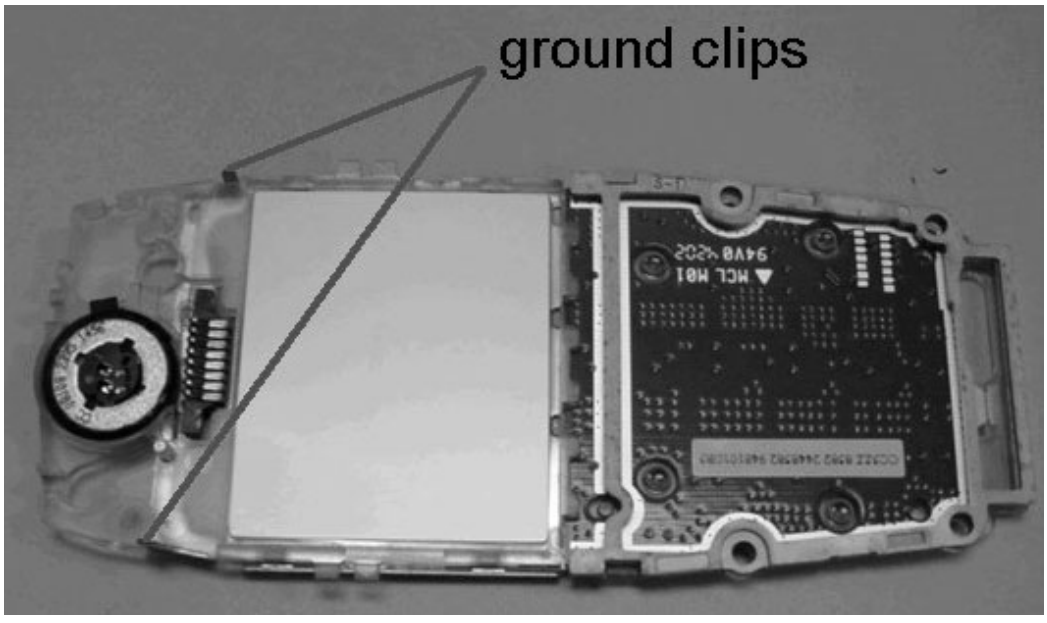

Figure 10: Display assembly

Note that the display frame is grounded to the PWB through the two ground clips. The grounding of the display frame will impact the radiation performance of the phone. If the clips are not touching the PWB, or are corroded, or obstructed, then the display frame should be replaced.

The following figures show the contact between the display frame ground clips and the PWB in greater detail.

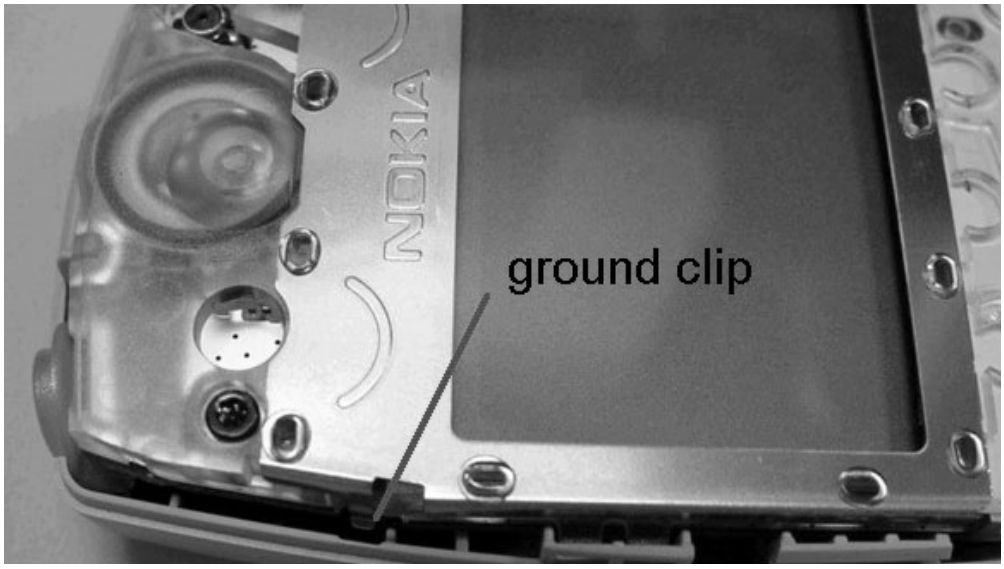

Figure 11: Ground clip on the left side of the display frame

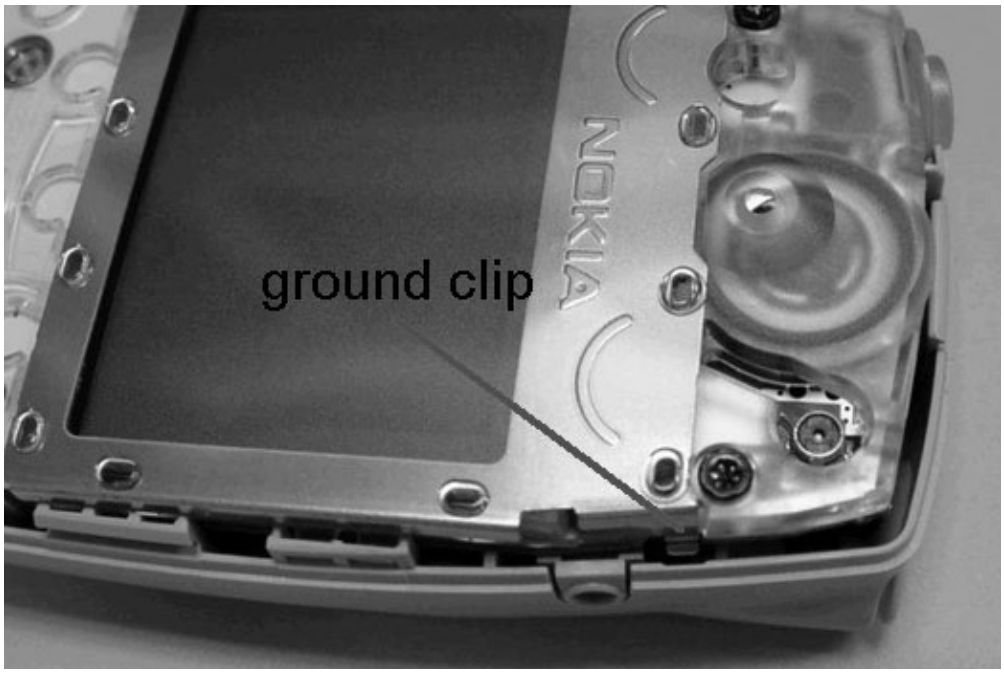

Figure 12: Ground clip on the right side of the display frame

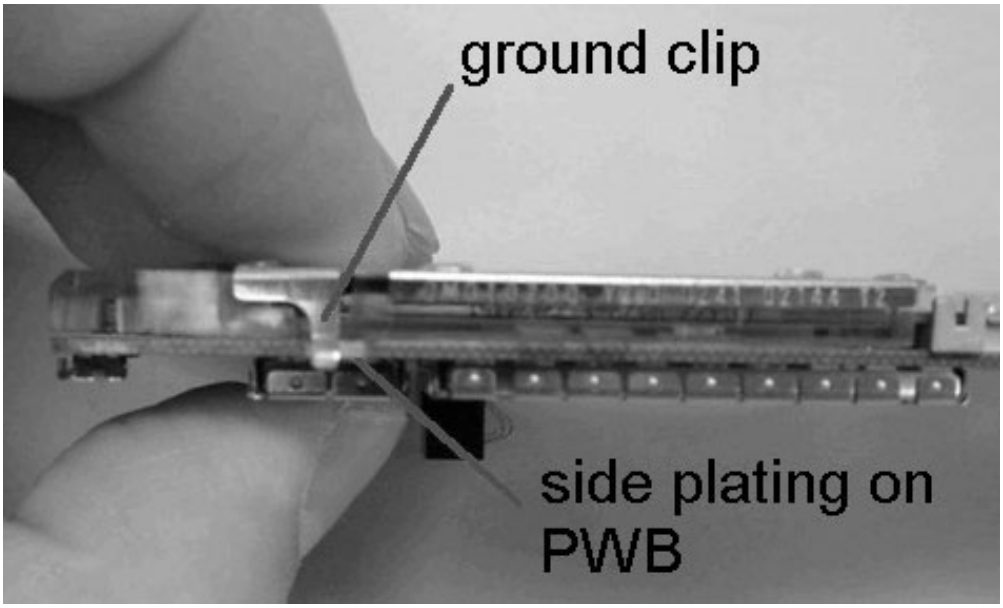

Figure 13: Contact between left ground clip of display frame and side plating of PWB.

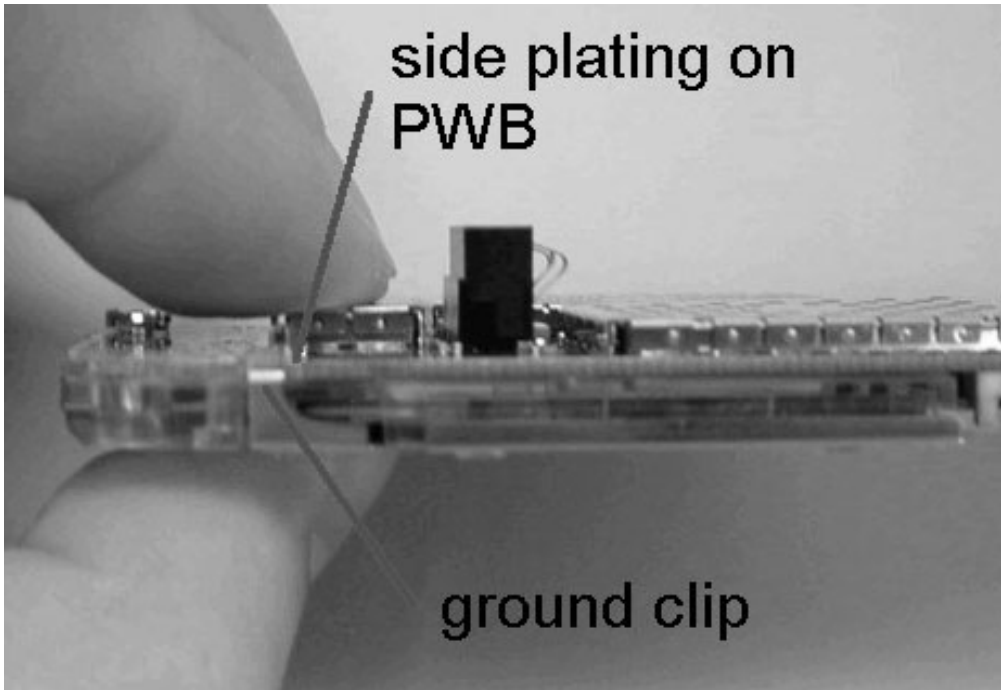

Figure 14: Contact between right ground clip of display frame and side plating of PWB.

Misinstalled Whip

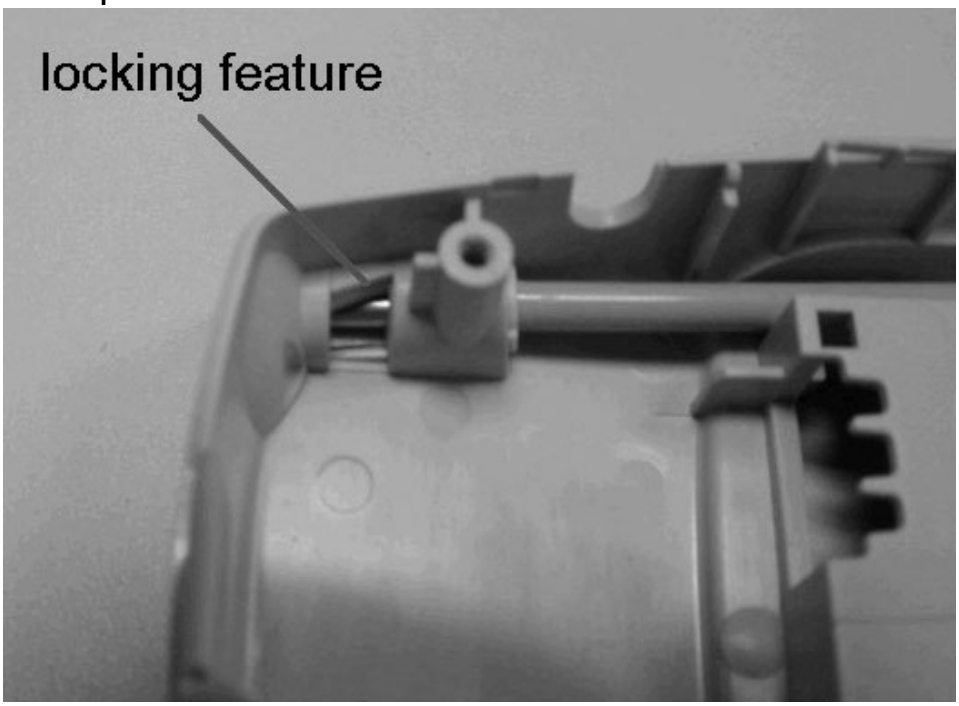

Figure 15: Locking feature for whip

The whip is locked into the D-cover when the internal antenna frame is installed. There is feature in the plastic frame of the internal antenna that interlocks with the locking feature of the whip. The whip plug has the locking feature, and also has a "key" that is supposed to make it difficult to install the whip plug with the wrong rotation. If the whip plug does get installed with the wrong rotation, then the whip will not be visible as seen through the locking feature as shown in Figure 15. In this case, if the whip cannot be removed, then the D-cover assembly will need to be replaced. Otherwise, simply replace the whip.

Damaged Whips

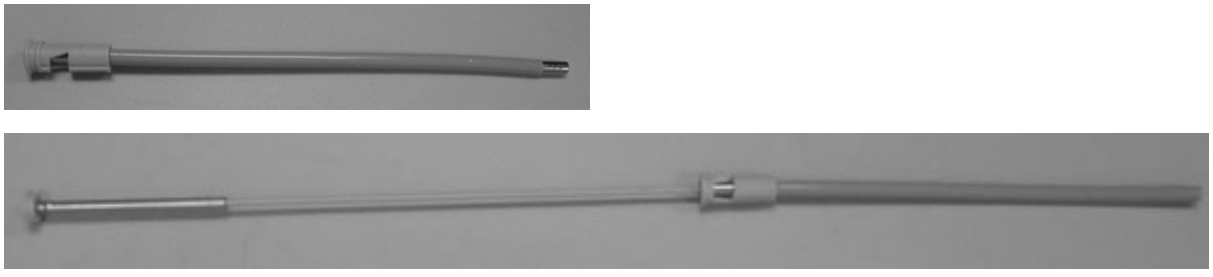

Figure 16: Whip stand alone in retracted and extended positions

The above figure shows what the whip should look like when it is retracted and extended. If the whip is damaged, simply use another.

Detuning Circuit for Bottom Antenna Clip

Figure 8 shows the bottom antenna clip. The detuning circuit is right next to the bottom antenna clip. If the detuning circuit is not installed properly, then the internal antenna gain will degrade by about 4-5 dB in the RX portion of CELL band. The detuning circuit consists of a 1nH coil inductor. If the inductor is missing, then install one. If the induc-

tor is installed upside down, then the pads are not soldered to the PWB and the inductor needs to be flipped and soldered correctly.

RF Connector Failure

The RF connector could fail by not connecting the RF input to the RF output of the RF connector. If this happens, then the antenna gain will degrade by about 25 dB. This can be checked by testing for DC conductivity between the RF input and RF output of the RF connector. Note the DC conductivity test must be done without any cable attached to the RF connector. Since the RF connector is also a switch, the RF output will be disconnected from the RF input when a cable is inserted into the RF connector. When a cable is inserted, the RF input is connected to the RF connector.

RF input - connector to duplexer, next to shunt inductor

RF output - connects to antenna pad through vias

RF connector - connects to coaxial cable

If the RF input is not connected properly to the RF output, then the RF connector must be replaced.